PATENT SPECIFICATION 973,638

DRAWINGS ATTACHED.

973,638

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COMPLETE SPECIFICATION.

Adjustable Control Pedal Mechanisms.

We, GENERAL MOTORS CORPORATION, a Company incorporated under the laws of the State of Delaware, in the United States of America, of Grand Boulevard, in the City of Detroit, State of Michigan, in the United States of America (Assignees of RONALD WESLY ROE), do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to adjustable control pedal mechanisms, for example for use in motor vehicles to allow the individual driver to select a driving position which is convenient and comfortable.

According to the invention an adjustable control pedal mechanism comprises an articulated parallelogram linkage which includes successively first, second, third and fourth links and is supported by a fixed pivot common to the first and fourth links, an adjustment member which can hold the first link in any of a plurality of adjusted positions, and a control pedal which is carried by the second link and is movable to cause the second and fourth links to pivot relatively to the first link and thereby effect movement of a control member connected to the fourth link.

The scope of the monopoly is defined by the appended claims ; the invention and how it can be performed are hereinafter particularly described with reference to the accompanying drawings, in which :—

Figure 1 is a side view, with parts broken away and in section, in the direction of arrows 1—1 of Figure 2, illustrating a preferred enbodiment of an adjustable control mechanism according to the invention with the pedals adjusted to a " long reach " position and unactuated, and including in schematic form some control elements which are actuable by the pedals ;

Figure 2 is a top view, with parts broken away and in section, of the mechanism of Figure 1 in the direction of the arrows 2—2 of Figure 1 ;

Figure 3 is a view similar to that of Figure 1 but shows the mechanism with the pedal height adjusted to a " short-reach " position, the pedals being unactuated ;

Figure 4 is a view similar to that of Figure 3, showing the brake pedal in the depressed, brake-apply position and the accelerator pedal is in the released, zero-throttle position ; and

Figure 5 is a view of the mechanism, generally similar to the vehicle driver's view, in the direction of the arrow 5 of Figure 3.

The adjustable control pedal mechanism is shown installed in a motor vehicle having a toe board 10 which also forms the vehicle fire wall, a mounting bracket 12 being secured to the fire wall under the instrument panel (not shown). The mounting bracket 12 includes yokes 14 and 15, an actuator bracket 16, and a top section 18 in which return stops 20 and 22 are mounted, each of the stops 20 and 22 including a bolt 24 and an adjusting and locking nut 26.

An articulated parallelogram linkage includes a first link comprising a brake and accelerator pedal support link 28 which is pivotally attached to the mounting bracket 12 by pivot bolts 30 and 32, which also respectively pass through the yokes 14 and 15. The bolts 30 and 32 are axially aligned on a common articulation axis identified in the drawings as A. The support link 28 is generally U-shaped : one leg is associated with the yoke 14 and the bolt 30, and the other leg is associated with the yoke 15 and the bolt 32.

[*Price*

A brake pedal 34 is secured to a second link comprising a brake pedal link 36 which is pivotally attached at one corner 38 to the lower end of the support link 28 by a bolt 40. An accelerator pedal 42 is similarly attached to an accelerator pedal link 44 and is also pivotally attached to the support link 28 by the bolt 40. The articulation axis formed by the bolt 40 is identified as B. A corner 46 of the brake pedal link 36 is pivotally attached to a third link comprising a brake link 48 by a bolt 50, this bolt forming an articulation axis identified as C. The accelerator pedal link 44 is similarly attached to an accelerator link 52 by a bolt 54, the axis of which also lies on the articulation axis C.

The fourth link of the articulated parallelogram comprises a brake bellcrank 56 which is pivotally attached to the yoke 14 by the bolt 30 so that the bell-crank also pivots about the axis A. The brake link 48 is pivotally attached to the bellcrank 56 by a bolt 58, the articulation axis formed by that bolt being identified in the drawings as D. The articulation axes A, B, C and D are parallel to and spaced from each other. An accelerator bellcrank 60 is similarly pivotally attached to the yoke 15 and the support link 28 by the 32 and has the accelerator link 52 pivotally attached to it by a bolt 62. The axis of this bolt also lies on the axis D. The bell-cranks 56 and 60 are generally Y-shaped as shown in Figure 5 so that their lower ends 64 and 66 provide single attachment points for respectively, a brake push rod 68 and a throttle push rod 70. The rods 68 and 70 are pivotally attached to the bellcranks 56 and 60 by pivot bolts 72 and 74. These rods also extend through openings formed in the mounting bracket 12 and the vehicle fire wall and are movable substantially in the axial direction when they are operated. The brake push rod 68 is connected to a brake master cylinder 76 which in turn is fluid-connected to actuate the vehicle wheel brakes 78. The throttle push rod 70 is connected to the engine carburettor 80 to actuate the engine throttle.

A tension spring 82 is connected between the brakebell crank 56 and a fixed lug 84, and urges the bellcrank 56 in an anticlockwire direction about the axis A so that the bellcrank in its rest position engages the return stop 20, the spring 82 thus functioning as a brake pedal return spring. A similar spring 86 is connected between a fixed lug 88 and the accelerator bellcrank 60 to urge the bellcrank in an anticlockwise direction into engagement with the return stop 22, the spring 86 thus functioning as an accelerator pedal return spring, and therefore assisting the usual throttle return spring.

The adjustable control pedal mechanism also includes a screw 90 which is threaded through a screw actuator 92 of the recircutory ball type (alternatively a worm type could be used). The housing of the actuator 92 is pivotally attached to the actuator bracket 16 by pivot screws 94 and 96. As shown in Figures 3 and 4, the actuator 92 is driven through a flexible cable 98 by a reversible electric motor 100, for which driver-actuable controls (not shown) are provided. Other types of power control, or manual control may alternatively be used.

One end of the screw 90 is pivotally attached by a pivot bolt 104 to a yoke 102 formed on the support link 28. The yoke 102 is spaced intermediate the axes A and B on the support link 28, and the screw 90 extends at an angle from the link 28 so that movement of the screw by the actuator 92 results in pivotal movement of the link 28 about the axis A. The screw actuator 92 and the threads of screw 90 are so constructed as to hold the screw 90 in any desired extended or retracted position by a locking action so that forces exerted axially of screw 90 will not cause the screw to rotate and change the pedal adjustment.

Figure 1 illustrates the mechanism with the pedals adjusted to a "long-reach" position. The brake pedal 34 is spaced from the toe board 10 only an amount sufficient to permit pivotal movement of the pedal about the axis B for actuation of the brakes. The same is true of the accelerator pedal 42. Since the brake and accelerator pedals operate in a similar manner, only the brake pedal operation will be described in details.

With the mechanism in the position shown in Figure 1, not only is the axis A fixed but also the axis B is held in a fixed position due to the holding action of the screw 90 and its actuator 92. The spring 82 holds the brake bellcrank 56 against the return stop 20, the brake push rod 68 exerting no force on the master cylinder 76. When the driver depresses the brake pedal 34, the pedal pivots clockwise about the axis B, thus moving the axis C downwardly and slightly forwardly of the vehicle. This movement causes the brake link 48 to move substantially axially, with a slight translatory movement, in a downward and forward direction. Since the link 48 is attached at the axis D to the bellcrank 56, the bellcrank is pivoted about the fixed axis A in a clockwise direction. This results in movement of the brake pivot bolt 72 in an arc which is substantially along the axis of the brake push rod 68, and since the push rod 68 is attached to the bellcrank 56 by the bolt 72, the push rod is likewise moved forward in a substantially axial direction. In the conventional manner, slight pivotal movement of the brake rod is permitted at the master cylinder so that the master cylinder is actuated linearly to apply the brakes. When the driver releases the pedal, the spring 82

returns the bellcrank 56 into engagement with the stop 20, thus moving the link 48 upwardly and rearwardly, thereby lifting the pedal 34 and pivoting it about the fixed axis B.

When it is desired to adjust the pedal height to a shorter-reach position, the driver engises the motor 100 in a direction causing the screw 90 to extend itself downwardly and rearwardly. The screw pivots the brake and accelerator and support link 28 counterclockwise about the axis A, at the same time itself pivoting about the screws 94 and 96. The pivotal movement of the link 28 about the axis A causes the axis B to move along a path 106 (Figure 3), and the axis C to move along a path 108. This occurs since the return spring 82 holds the axis D on the bellcrank 56 fixedly against the stop 20. The pivotal movement of the link 28 does not cause movement of the bellcrank 56, and therefore there is no change in the position of the brake push rod 68 as a result of this adjustment. The pedal 34 may be adjusted to the position shown in dash lines in Figure 1, or to any intermediate position. Figure 3 shows the "short-reach" adjusted position of the pedal, with the "long-reach" adjusted position in dash lines.

The mechanism disclosed can thus hold the brake and accelerator pedals in an infinite number of adjusted positions relatively to the vehicle toe board independently of brake and accelerator actuation, and may be readily so adjusted to suit any driver. The mechanism includes a parallelogram formed by four articulated links one of which is always stationary and two of which are alternatively stationary, one during adjustment of pedal height and the other during pedal actuation. At no time is the control link for the brake or accelerator push rod moved in order to adjust the pedal height, this adjustment being attained by means of the screw-type link having an adjustable effective length. The mechanism therefore operates to provide a more satisfactory pedal position for the driver of the vehicle without affecting the pedal operation.

WHAT WE CLAIM IS:—

1. An adjustable control pedal mechanism comprising an articulated parallelogram linkage which includes successively first, second, third and fourth links and is supported by a fixed pivot common to the first and fourth links, an adjustment member which can hold the first link in any of a plurality of adjusted positions, and a control pedal which is carried by the second link and is movable to cause the second and fourth links to pivot relatively to the first link and thereby effect movement of a control member connected to the fourth link.

2. An adjustable control pedal mechanism comprising an articulated parallelogram linkage which includes successively first, second, third and fourth links and is supported by a fixed pivot common to the first and fourth links, an adjustment member which can hold the first link in any of a plurality of adjusted positions, a control pedal which is carried by the second link and is movable to cause the second and fourth links to pivot relatively to the first link and thereby effect movement of a control member connected to the fourth link, and a spring which urges the fourth link towards a return stop.

3. An adjustable control pedal mechanism according to Claim 1 or 2, wherein the fourth link comprises a bellcrank.

4. An adjustable control pedal mechanism according to Claim 3, wherein the control member comprises a push rod which is pivotally connected to an end portion of the bellcrank.

5. An adjustable control pedal mechanism according to any one of Claims 1 to 4, wherein the adjustment member comprises a fifth link which is of adjustable effective length and is pivotally connected to the first link at a point remote from the fixed pivot.

6. An adjustable control pedal mechanism according to Claim 5, wherein the adjustment member is pivotally mounted and its pivotal connection to the first link comprises a lug or yoke which is formed on the first link intermediate the ends thereof and extends in the general direction of the third link.

7. An adjustable control pedal mechanism according to Claim 6, wherein the adjustment member comprises a screw and nut actuator.

8. An adjustable control pedal mechanixm according to Claim 7, including a drive member for effecting rotary movement of the actuator nut for selectively increasing and decreasing the effective length of the adjustment member.

9. An adjustable control pedal mechanism according to any one of Claims 1 to 8, wherein a single adjustment member is connected for adjustment of the position of a pair of control pedals.

10. An adjustable control pedal mechanism according to Claim 9, wherein one of the control pedals is a brake pedal and the other is an accelerator pedal.

11. An adjustable control pedal mechanism substantially as hereinbefore particularly described and as shown in the accompanying drawings.

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Chartered Patent Agent.

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from which copies may be obtained.

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5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

FIG1

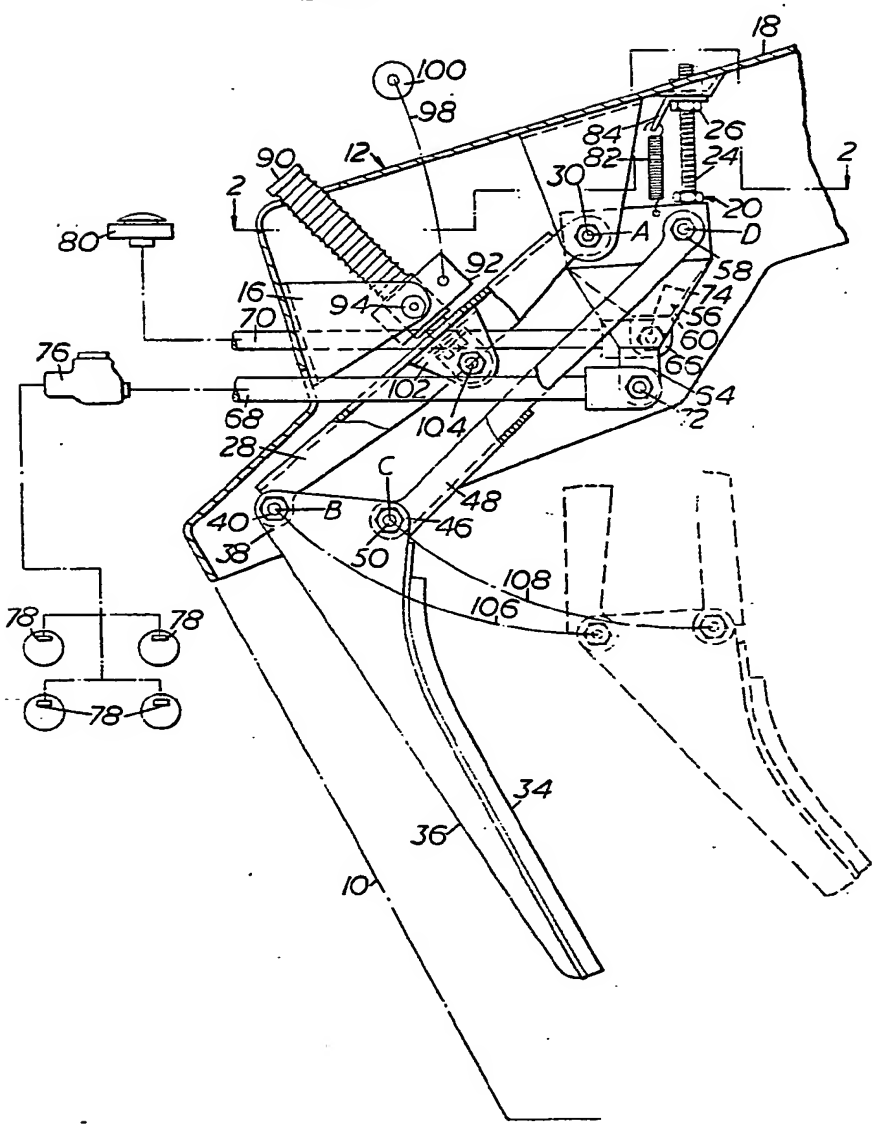
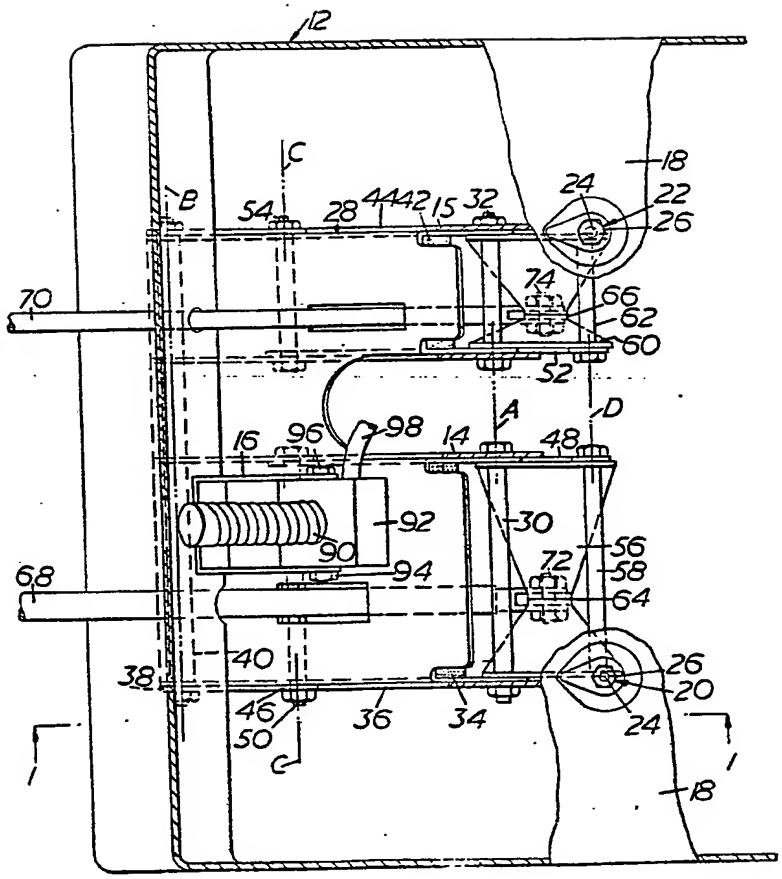


FIG.2.



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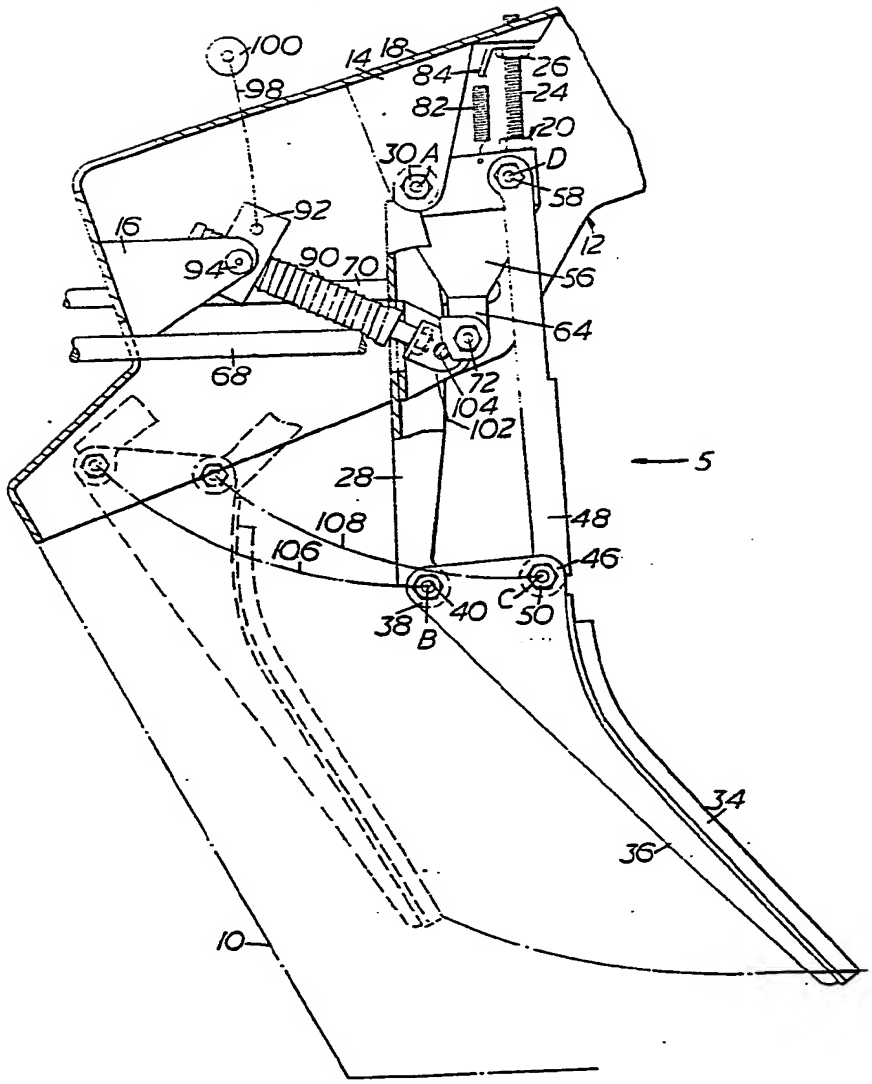
Sheets 2 & 3

FIG.3



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Sheets 2 & 3

FIG2.

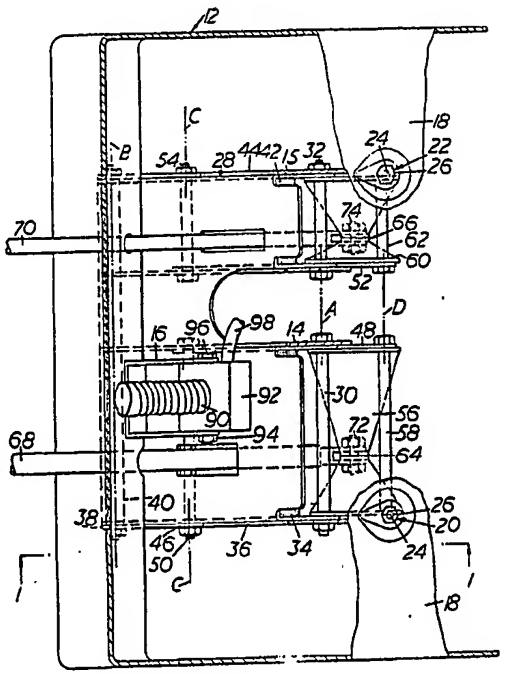


FIG3

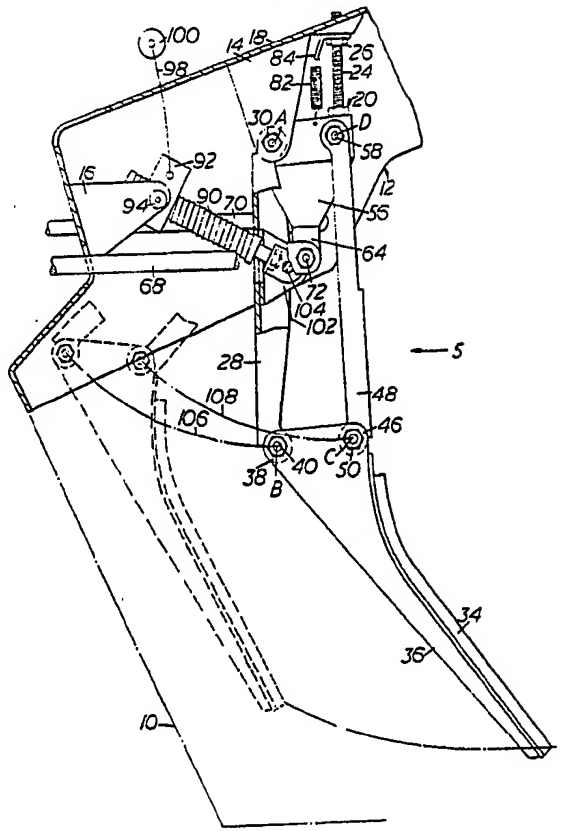
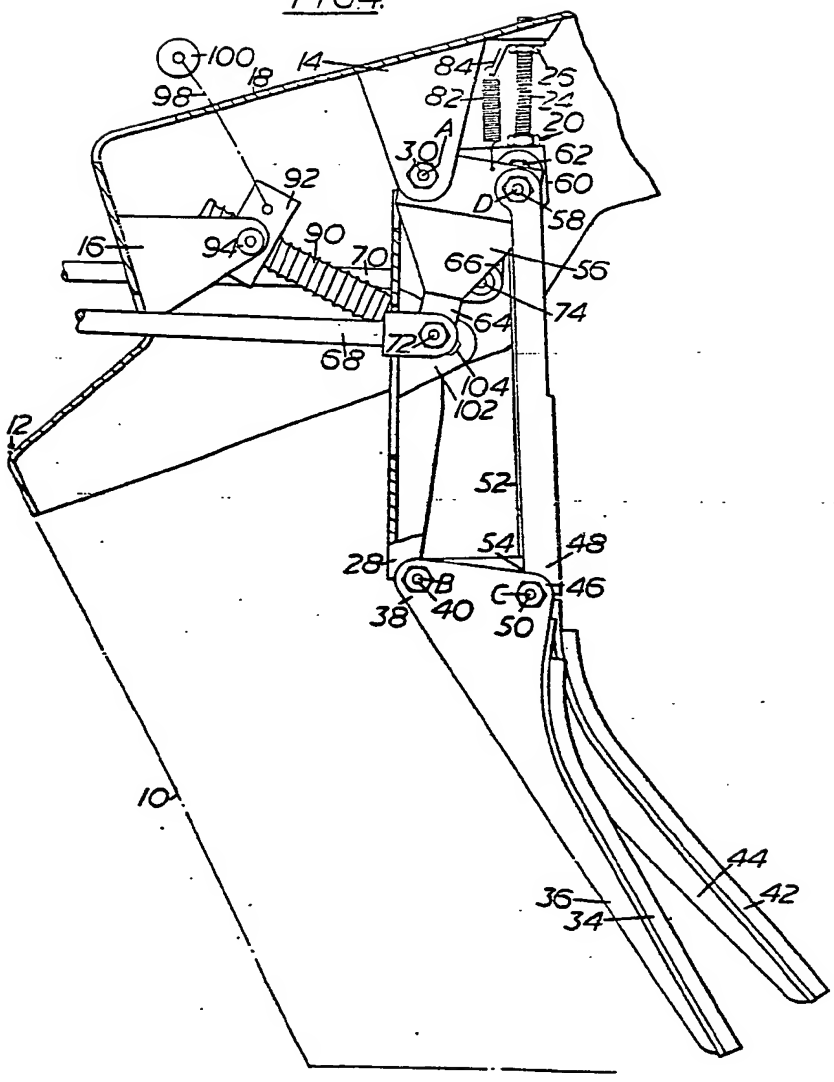


FIG4.



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5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 4 & 5

FIG.5.

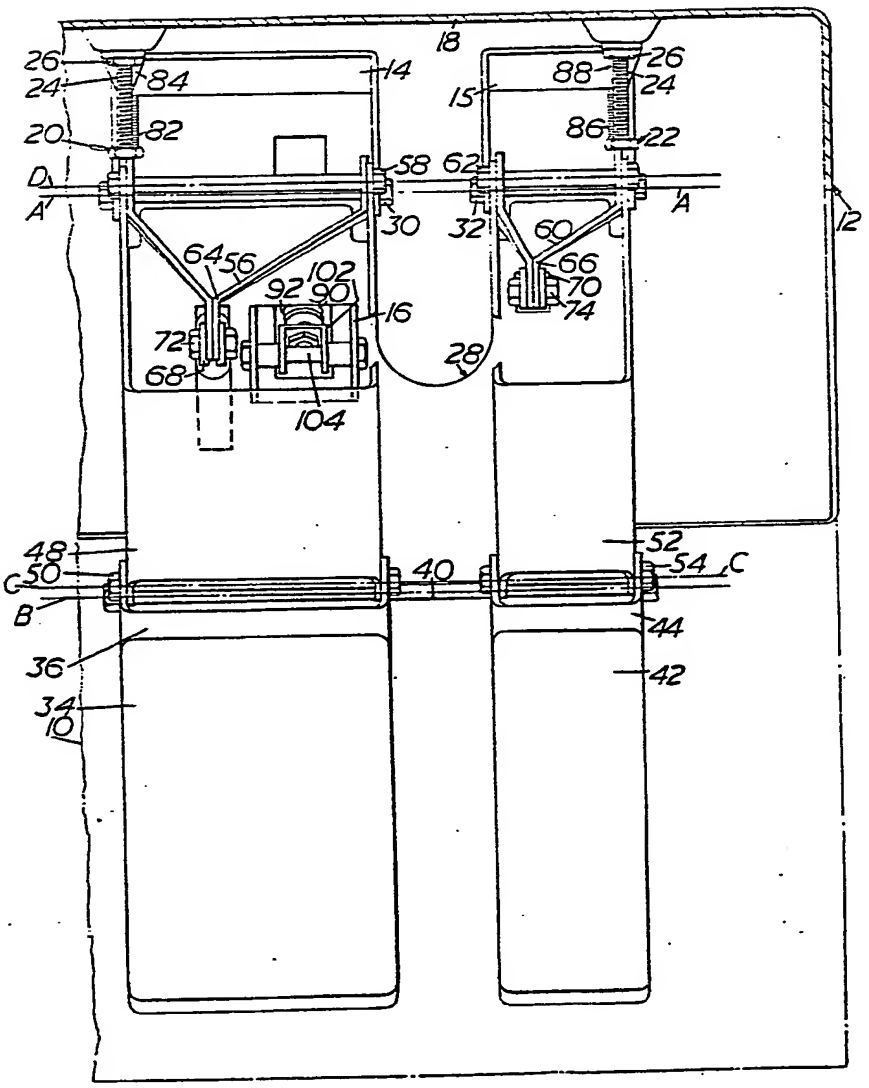

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FIG4

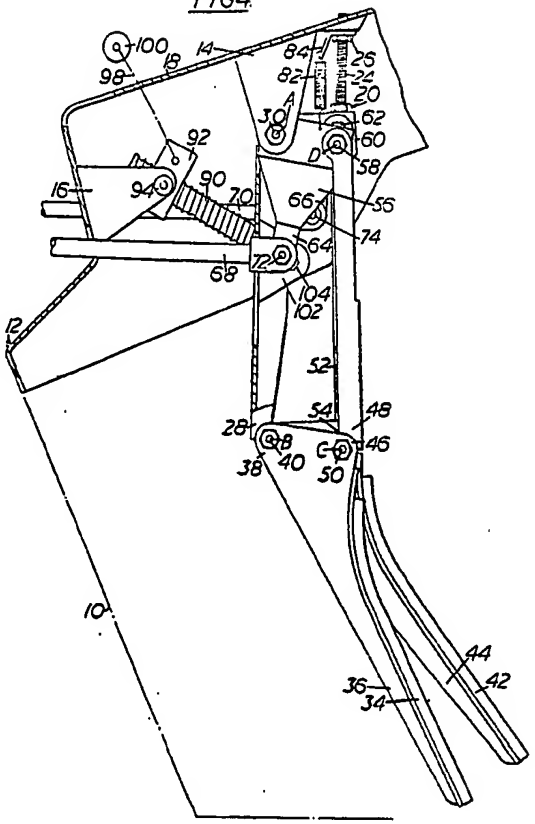

FIG5